

Minimum Travel Times between European Regions

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An assessment of the ACARE 4h-Goal

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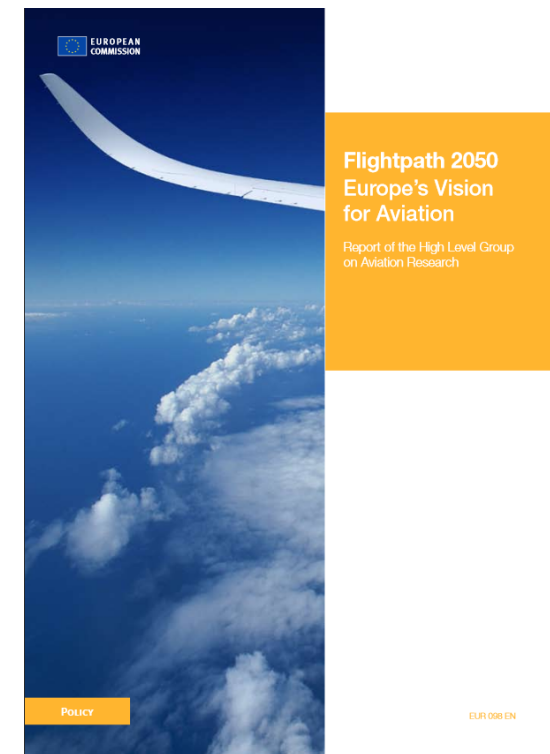
Agenda

- Background
- Research Question
- Data and Methodology
- Results
- Interpretation
- Conclusion



Background

- ACARE = Advisory Council for Aviation Research and innovation in Europe
- Development of strategic roadmaps for the development of aeronautics and air transport in Europe
- Key areas: Environment, Safety, Security, Customer Orientation
- SRIA (Strategic Research and Innovation Agenda) supported by national and European Programs (e.g. Horizon 2020, JTI Clean Sky)
- Objectives adopted by European Commission for 2050 (Flightpath 2050)



Research Question

- In the Flightpath 2050 document, we find various objectives of what should have been achieved until 2050
- In the area “meeting societal & market needs” we find:

90% of travellers within Europe are able to complete their journey, door-to-door within 4 hours.

- This political statement triggers various scientific questions, among them:
 - To what extent is the objective achieved already today?
 - Is it economically efficient trying to achieve this objective?
 - What are the means contributing to the achievement of this objective?



Data and Methodology

Elements for the assessment of the current state of the ACARE-90%-objective

- European origin-destination passenger demand data matrix
- Flight schedules
- Train schedules (limited to air/rail codesharing)
- Ground access/egress times between NUTS regions and airports
- Assumptions on process times (MCT, time from airport arrival to flight departure / flight arrival until exit from airport)



Data and Methodology

- European origin-destination passenger demand data matrix
 - ETISplus project provides European origin-destination passenger demand matrix
 - Data for 2010 on NUTS3-level (NUTS2-level used in the analysis)
- Flight / train schedules
 - OAG flight schedules for May 2012, including rail segments
 - Shortest path search algorithm
- Ground access / egress times
 - Google Maps car travel times
 - Assumptions on access/egress times
- Transfer Times / Code Sharing vs. Interlining
 - Assumptions / sensitivity analysis 15, 30, 45, 60 min MCT
 - Transfers only between airlines that apply code sharing or all airlines



Data and Methodology

Shortest path search algorithm (modified Dijkstra) applied – search for minimum total travel time

$$tt_{min}(X, Y) = \min_{XY} (tt_{X,A} + at + tt_{A,B} + dt + tt_{B,Y})$$

The minimum travel time between regions consists of the following elements:

- travel time from the point of origin to the departure airport ($tt_{X,A}$)
- the process time required from the arrival of the passenger at the departure airport to the scheduled time of departure (at)
- the flight time from the departure to the arrival airport ($tt_{X,A}$) – in case of a connecting flight, this element also contains the flight time of the first flight segment, the transfer time at the hub and the flight time of the second flight segment
- the process time required from the scheduled arrival time at the arrival airport to the point in time when the passenger leaves the arrival airport (at)
- travel time from the arrival airport to the destination point ($tt_{B,Y}$)



Data and Methodology

Scenarios tested:

Trip demand

- “ETISplus”: Modelled origin-destination trip demand from EU project ETISplus
- “Population product”: Theoretical situation, in which each EU citizen visits each other EU citizen

Air transport network

- Minimum connection times: 15, 30, 45, 60 minutes transfer time
- Permitted connections: Code share (only flights with same airline code) vs. interlining (all airlines)

⇒ 16 different combinations of trip demand, transfer times and permitted connections



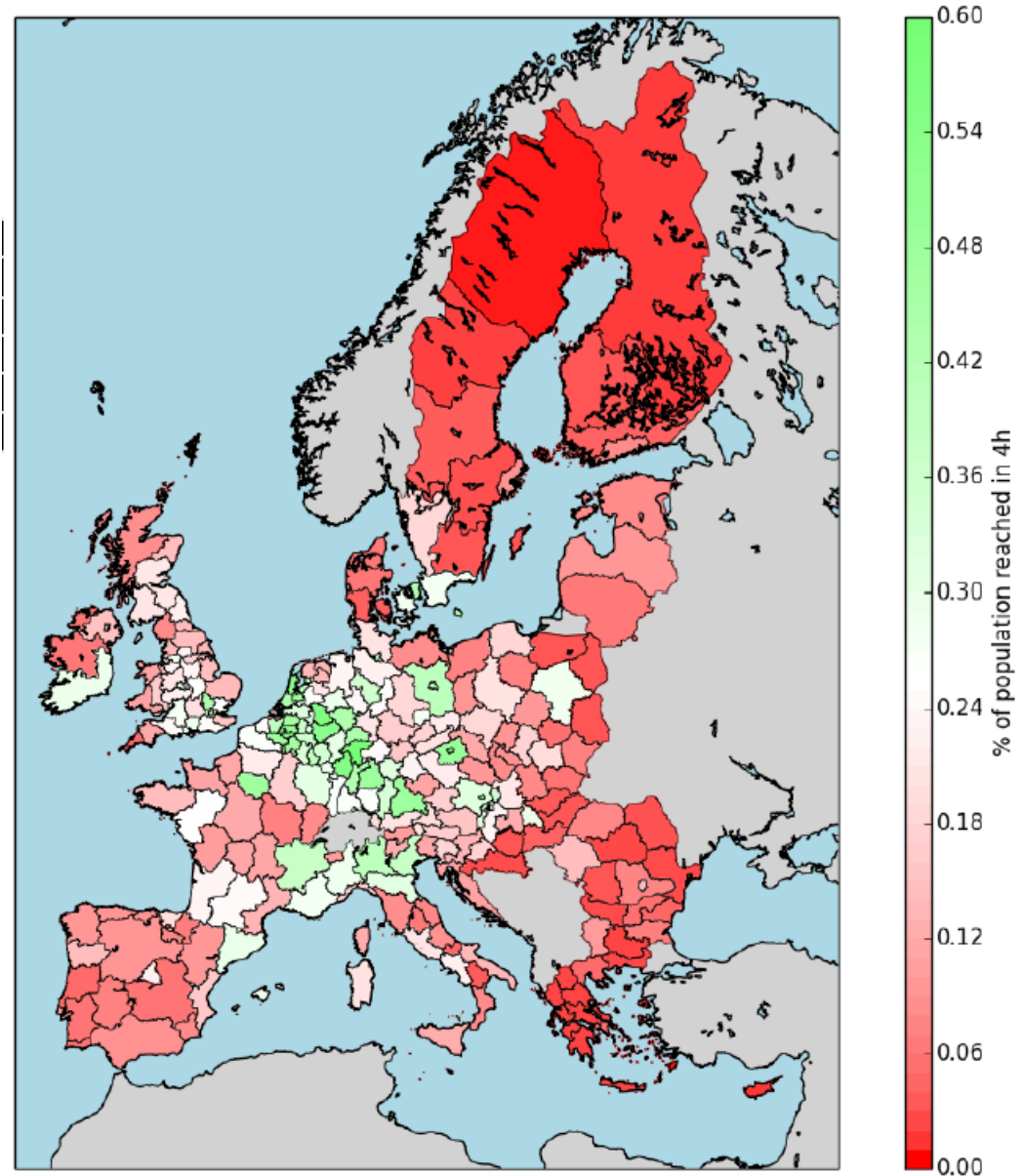
Results

trips data	air-air transfer modus	transfer time			
		15	30	45	60
ETIS-Plus	code share	97.09%	95.54%	93.51%	91.66%
	interlining	97.17%	95.64%	93.53%	91.67%
population product	code share	43.61%	33.84%	21.78%	13.12%
	interlining	44.43%	33.98%	21.79%	13.12%

Already today 91.7% of travellers can complete their journeys within 4 hours (with 60 min MCT in air transport)

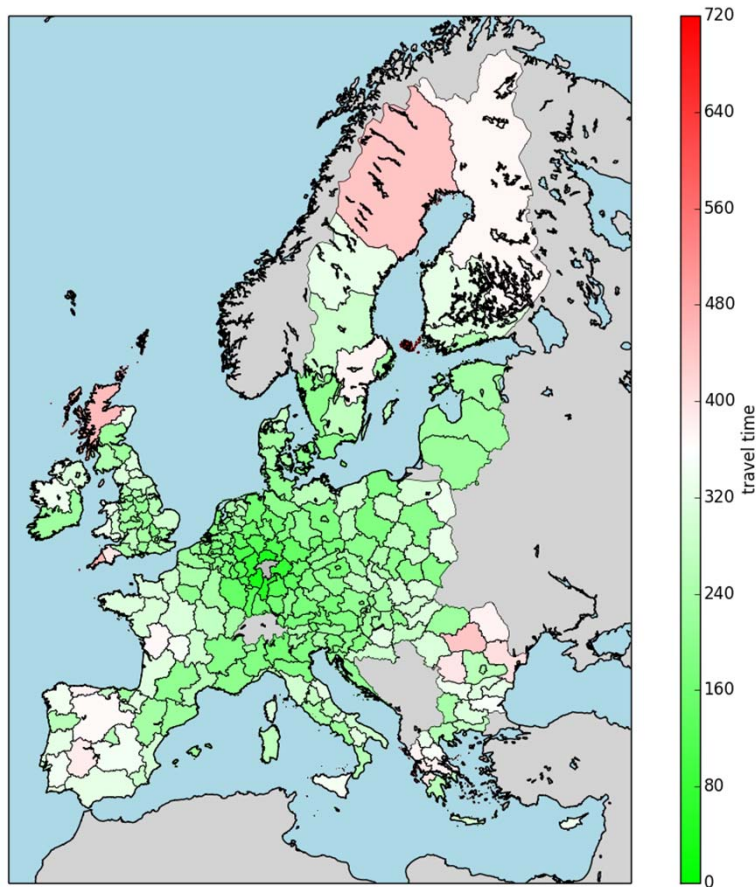
Only 13.1% of trips would be completed within 4 hours if every EU citizen would try to reach each other EU citizen

Reason for discrepancy: Most trips represented by ETISplus are on relatively short distances

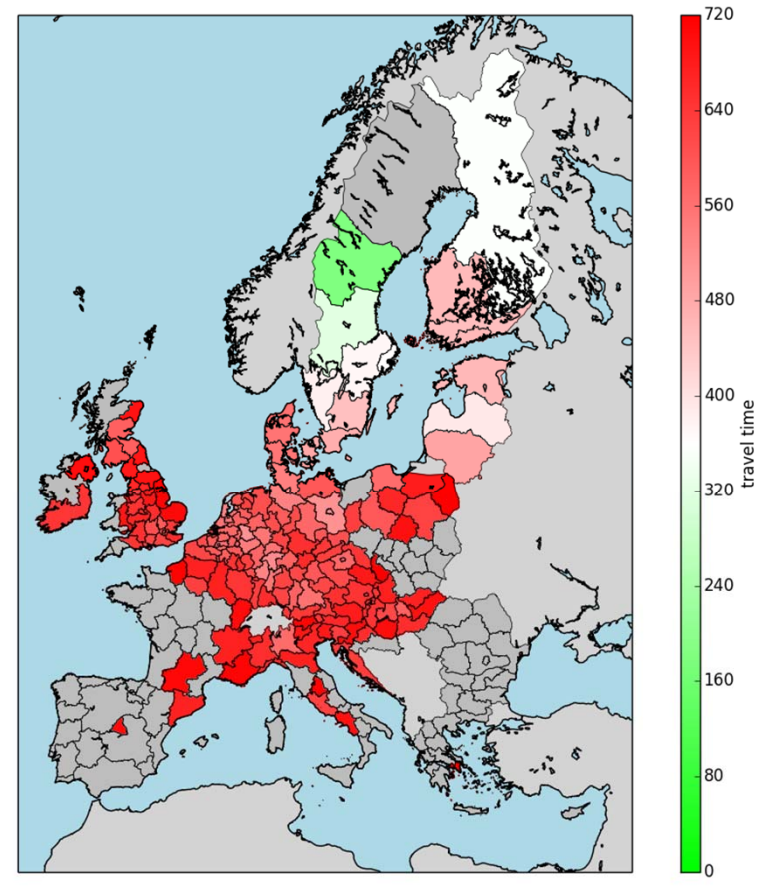


Results

The Flightpath2050 4-hour-goal in regional perspective



DE71 (Rhein-Main-Area)

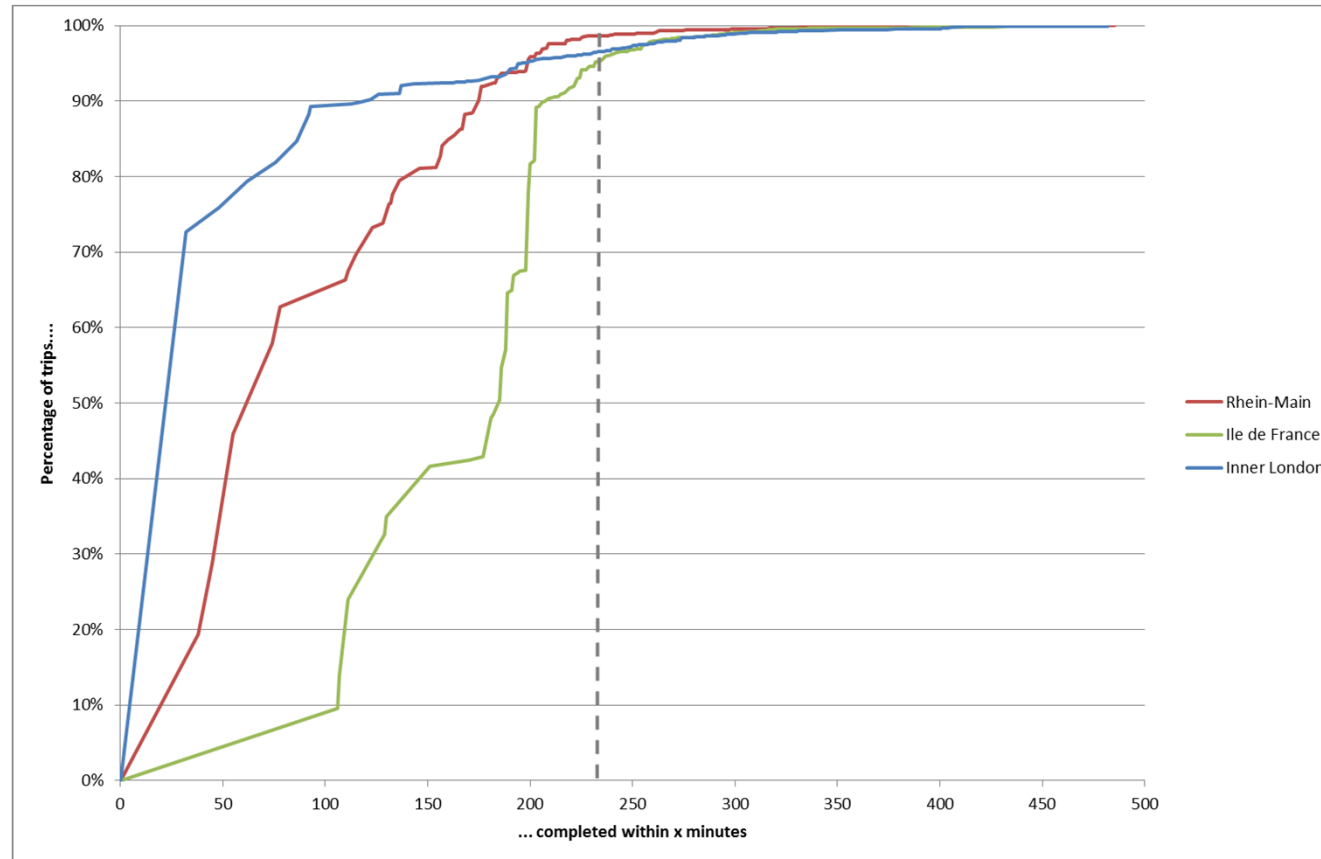


SE33 (Upper Norrland)



Results

The Flightpath2050 4-hour-goal in regional perspective

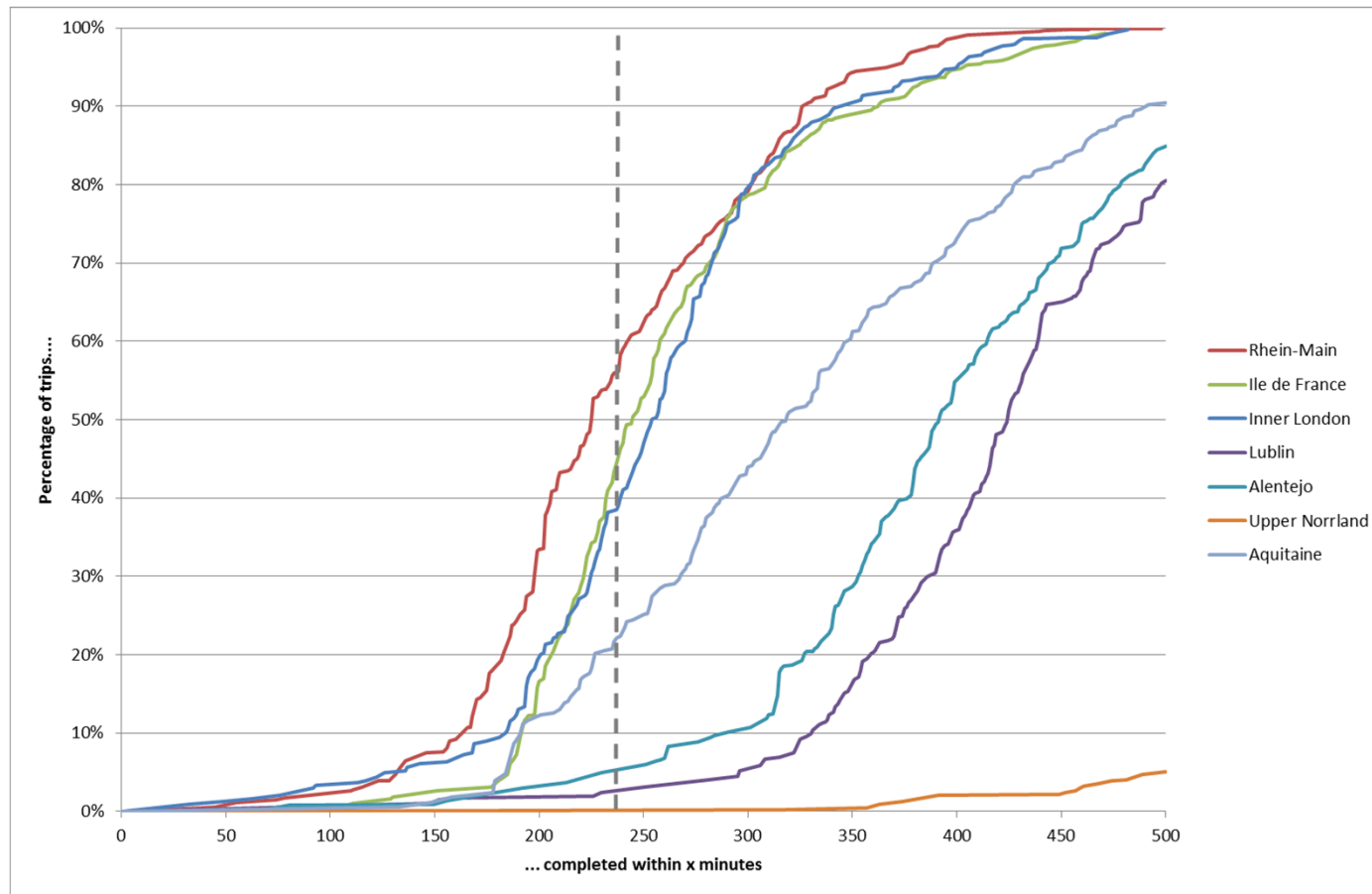


Cumulative distribution in scenario ETISplus / code share / 45min transfer



Results

The Flightpath2050 4-hour-goal in regional perspective

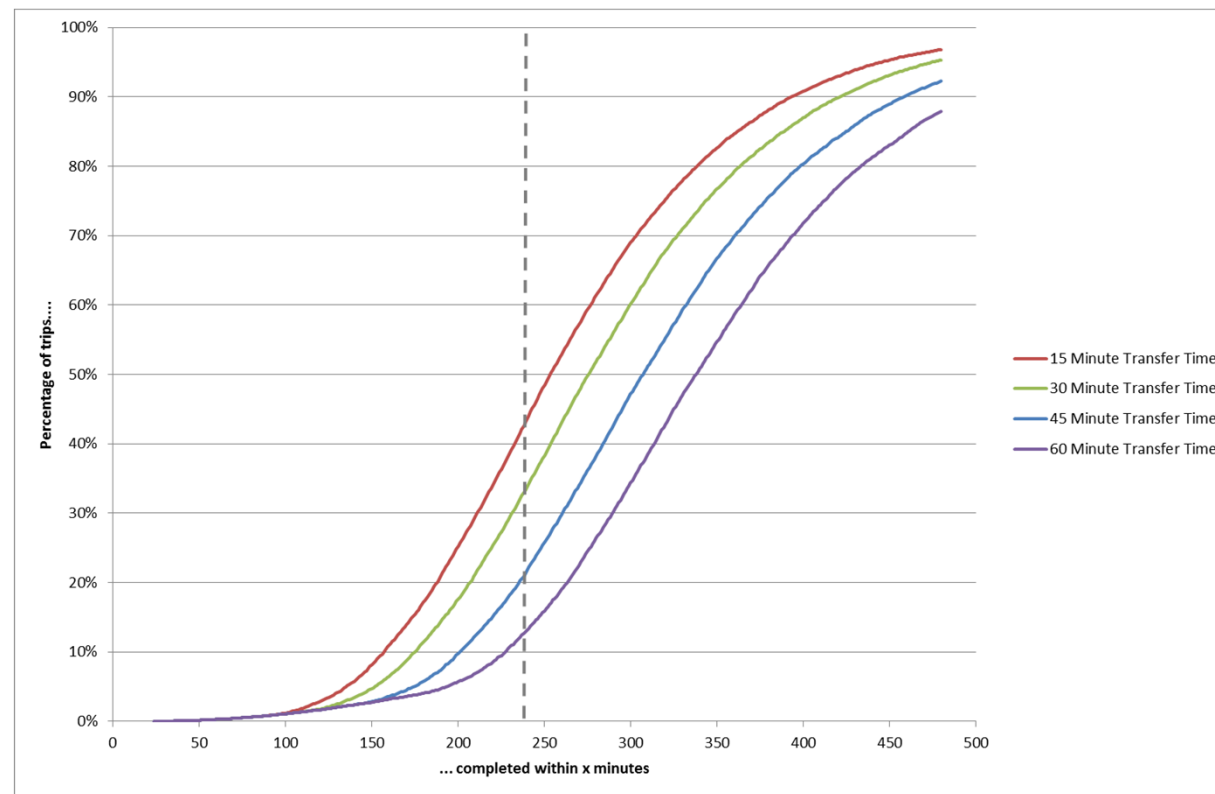


Cumulative distribution in scenario population product / code share / 45min transfer



Results

Factors contributing to the achievement of the 4-hour-goal: Reducing transfer times within and between modes



Cumulative distribution in scenario ETISplus / code share / 45min transfer



Interpretation

- Already today, more than 90% of the trips shown in the ETISplus database can be completed within 4 hours
- This is due to the fact that most trips are over short distances, which can be completed within 4 hours with car / rail modes
- But, if a theoretical situation in which every EU citizen should have the opportunity to visit every other EU is aspired, the goal has been achieved only to 13% (60minute MCT) or 22% (45min MCT)
- We propose to re-phrase the Flightpath2050 goal, e.g.:

*90% of travellers within Europe are able to complete their **long-distance journey of over 200km (or 250km or 300km...)**, door to door, within 4 hours.*

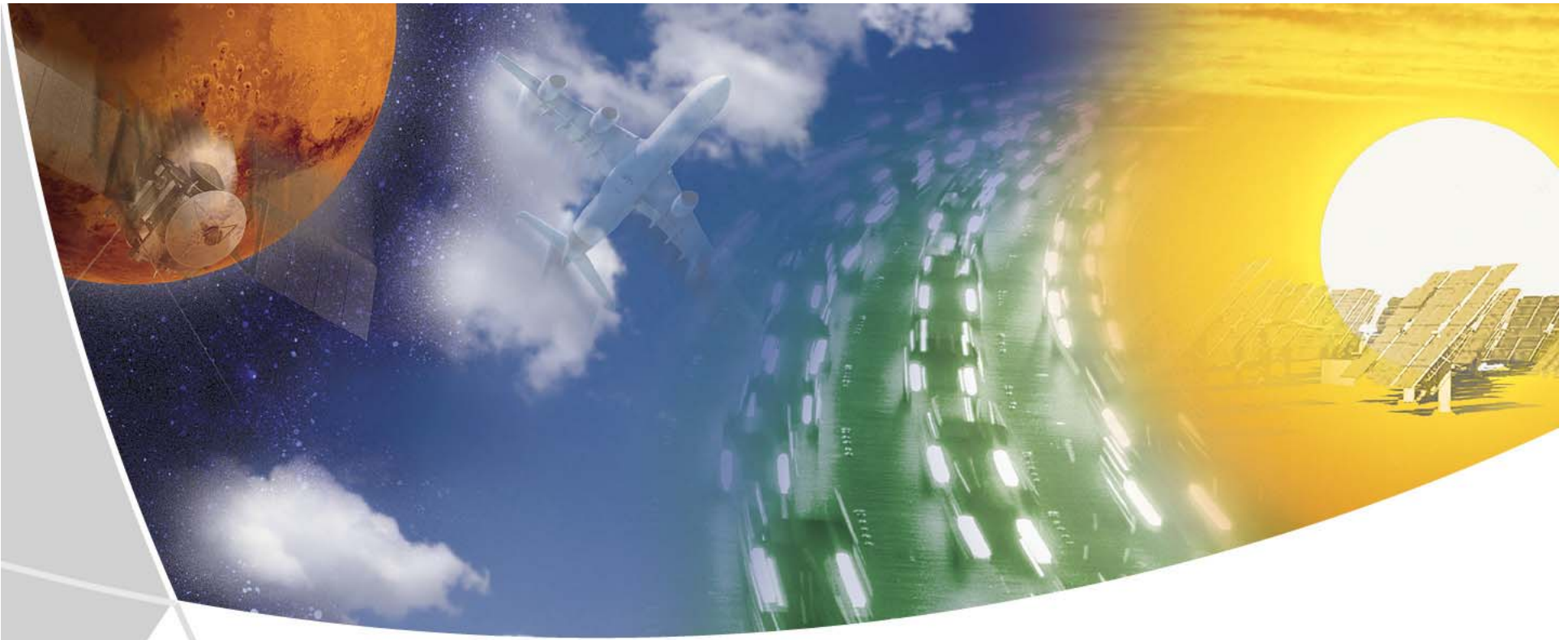


Conclusion

Areas for further research:

- What is the economic rationality behind the reduction of travel times? – Comparison of costs and benefits
- How would transfer concepts for low cost carriers (“self-help hubbing”) change the accessibility of regions?
- How can reductions in airport process times (check-in deadline, minimum connection times) contribute to a reduction of door-to-door travel times – are they more cost efficient than expensive new infrastructure?
- How can conflicting goals of stakeholders be resolved (e.g. increase in non-aeronautical revenues with longer dwell times at terminals vs. short journey times)?
- What is the potential for small air transport (<19 seats) for the accessibility of remoter regions?





Merci beaucoup pour
votre attention!

Thank you very much
for your attention!



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